



Identifier: LANL-ER-QP-6.4	Revision: 0	Effective Date: 09/09/02	 <p>ENVIRONMENTAL RESTORATION PROJECT</p> <p>A Department of Energy Environmental Cleanup Program</p>
ER Document Catalog Number: ER2002-0291			
Author: Andrew E. Gallegos			
<p>Environmental Restoration Project Quality Procedure</p> <p>for:</p> <h1>Preparation of Environmental Restoration Design Drawings</h1>			
 <p>Los Alamos NATIONAL LABORATORY</p> <p>Los Alamos NM 87545</p>		<p>Los Alamos National Laboratory, an affirmative action/equal opportunity employer, is operated by the University of California for the United States Department of Energy under contract W-7405-ENG-36.</p>	

Revision Log

<i>Revision No.</i>	<i>Effective Date</i>	<i>Prepared By</i>	<i>Description of Changes</i>	<i>Affected Pages</i>
R0	09/09/02	Andrew E. Gallegos	New Procedure	All

Preparation of Environmental Restoration Design Drawings

Table of Contents

1.0	PURPOSE	4
2.0	SCOPE.....	4
3.0	TRAINING.....	4
4.0	DEFINITIONS	4
5.0	RESPONSIBLE PERSONNEL.....	5
6.0	REFERENCES	6
7.0	PROCEDURE	6
7.1	Implement a Review of Conceptual Design Information.....	6
7.2	Prepare Drawing	7
7.3	Seal Construction Documents	9
7.4	Control Revisions to Certified Drawings.....	9
7.5	Control ER Project Certified Drawings	10
7.6	Control Certified Drawings by Non-ER Project Architect/Engineering Firms	10
7.7	Review and Approve Revised Drawings	10
7.8	Maintain Record Drawing Copies.....	10
7.9	Review, Approve, and Control Drawings	10
7.10	Revise “Issued for Construction” Drawings	11
7.11	Control As-Built Information	11
7.12	Enter Record Drawings Identification	11
7.13	Issue Record Drawings	11
8.0	LESSONS LEARNED.....	12
9.0	RECORDS.....	12
10.0	ATTACHMENTS	12
	Preparation of ER Design Drawings Process Flow Diagram	13

Preparation of Environmental Restoration Design Drawings

1.0 PURPOSE

This quality procedure (QP) states the responsibilities and describes the processes for the preparation, review, approval, and control of design drawings on the ER Project.

2.0 SCOPE

- 2.1 All **ER Project personnel** shall implement this mandatory QP when preparing design drawings for the ER Project.
- 2.2 **Subcontractors** performing work under the ER Project's quality program shall follow this QP when preparing design drawings for the ER Project.

Or

Subcontractors may use their own procedure(s) as long as the substitute meets the requirements prescribed by the ER Project Quality Management Plan and approved by the ER Project's Quality Program Project Leader (QPPL) before the commencement of designated activities.

3.0 TRAINING

- 3.1 **ER Project** personnel shall train to and use the current version of this QP; contact the author if the QP text is unclear.
- 3.2 **ER Project** personnel using this QP shall document training in accordance with LANL-ER-QP-2.2, Personnel Orientation and Training; the training database is located at <http://erinternal.lanl.gov/Training/login.asp>.
- 3.3 The responsible **supervisor** shall monitor the proper implementation of this procedure and ensure that the appropriate personnel complete all applicable training assignments.

4.0 DEFINITIONS

- 4.1 *Architect/Engineer* — A firm or organization selected to perform design and/or engineering services.
- 4.2 *As-Built Drawing* — A record drawing that reflects the existing or as-installed configuration of Structures, Systems, or Components within specified design tolerances defined by codes, standards, or modification requirements.

- 4.3 *Conceptual Design* — A pre-Title I activity that incorporates conceptual design estimates, conceptual design plan, conceptual project schedule, conceptual design report, and a constructability review.
- 4.4 *Construction Drawings* — Those drawings approved for use in construction.
- 4.5 *Design Agent* — The organization assigned the responsibility for formulation of the design in accordance with established plans and procedures. Normally this is an Architect/Engineer (A/E) firm or a Construction Contractor.
- 4.6 *Certified/Sealed Drawing* — A drawing that bears the seal and signature of a registered professional engineer.
- 4.7 *Construction Issue* — All drawings issued for construction including all subsequent revision issues.
- 4.8 *Engineer of Record* — The engineer (individual or organization) under whose direction and continuing supervision design work is performed.
- 4.9 *Preliminary Issue* — All issues of a drawing for other than field construction purposes. This includes issues for information only, permit applications, and for design reviews.
- 4.10 *Redlined Drawing* — An approved for design drawing that has been marked up to represent actual design implementation and/or changes to designs. Modifications to approved design drawings are made in conjunction with approved design field changes, and are used to implement and complete a configuration management process (e.g., As Built Drawing).
- 4.11 *Supervisor* — An individual assigned to the ER Project who is a group, focus, task, or project leader or a manager with the authority and responsibility to direct and authorize ER Project activities.

5.0 RESPONSIBLE PERSONNEL

The following personnel are responsible for activities identified in this procedure:

- Design Agent
- Design Manager
- ER Project Personnel
- Quality Program Project Leader (QPPL)
- Subcontractors
- Supervisor
- Task Leader
- University Technical Representative (UTR)

6.0 REFERENCES

To implement properly this QP, ER Project personnel should become familiar with the contents of the following documents located at

http://erinternal.lanl.gov/home_links/Library_proc.shtml:

- ER Project Quality Management Plan
- LANL-ER-QP-2.2, Personnel Orientation and Training
- LANL-ER-QP-3.2, Lessons Learned
- LANL-ER-QP-4.4, Record Transmittal to the Records Processing Facility
- LANL-ER-QP-6.3, Design Review
- LANL-ER-QP-6.8, Design Changes
- Los Alamos National Laboratory Drafting Manual, OST220-03-01-DM, located at [FWO-FE Manual Set Index Page \(external\)](#)
- Los Alamos National Laboratory Engineering Manual, LIR 220-03-01.1, located at [FWO-FE Manual Set Index Page \(external\)](#)
- New Mexico Engineering and Surveying Practice Act (Chapter 61, Article 23 NMSA 1978), located at <http://www.state.nm.us/pepsboard/Act.htm>

7.0 PROCEDURE

7.1 Implement a Review of Conceptual Design Information

- 7.1.1 **ER Project Personnel** shall submit to the Design Manager conceptual design information (e.g., conceptual design estimates, design plan, project schedule, design report, constructability review, sketches, preliminary calculations, data, material lists, reference documents etc.), which will be used in the development of design drawings.
- 7.1.2 The **Design Manager** shall ensure plans, sections, layouts, and details are designed and arranged to efficiently communicate the proposed design. The set of drawings in each construction package will typically include a title sheet with location plan map, site plan, and drawing index along with detailed design drawings such as plot plans, profiles, grading plans, sections, and details.
- 7.1.3 The **UTR** shall ensure that a unique project ID number (e.g., the project ID number addressed in the applicable Statement of Work) is assigned to all construction drawings and associated design documentation.

7.2 Prepare Drawing

The **Design Manager** shall ensure that drawing preparation for the ER Project proceeds as follows:

7.2.1 Produce Drawing Sizes

7.2.1.1 The **Design Agent** shall produce standard construction drawings and individually controlled drawings on a “D” size (24 x 36 in.) sheet.

7.2.1.2 The **Design Agent** shall produce Engineering Studies, Conceptual Design Reports, and Design Criteria drawings on a “B” size (11 x 17 in.) sheet whenever possible.

7.2.2 Use Appropriate Format and Orientation

7.2.2.1 The **Design Agent** shall use the LANL Drafting Manual, OST220-03-01-DM, located at [FWO-FE Manual Set Index Page \(external\)](#) as a reference to format and orient drawings.

Note: In creating drawing files, the preferred standard is AutoCAD Release 14 or 2000 options, but third party software that is completely compatible and supportable by AutoCAD Release 14 or 2000 is acceptable.

7.2.2.2 If another graphic software is used to create a drawing file, the **Design Agent** shall deliver the file in a format that can be recognized by and converted to AutoCAD (e.g., ASCII format, DXF file).

7.2.2.3 The **Design Agent** shall use plotting configurations in accordance with the LANL Drafting Manual, OST220-03-01-DM.

7.2.3 Use Appropriate Title Blocks and Revision Blocks

7.2.3.1 The **Design Agent** shall ensure all drawings contain a title block and a revision block.

7.2.3.2 The **Design Agent** shall ensure title blocks conform to the LANL Drafting Manual, OST220-03-01-DM requirements.

7.2.3.3 The **Design Agent** shall ensure assignment of drawing numbers in accordance with section 7.3.7 of this procedure.

7.2.4 Use “NOT FOR CONSTRUCTION” Notation

The **Design Agent** shall ensure the note “**NOT FOR CONSTRUCTION**” is entered (e.g., marked in red ink) on all in-progress construction drawing sheets in a Construction Drawing Set.

Do not remove this notation until the drawings are approved for final release.

7.2.5 Use Appropriate Scales

The **Design Agent** shall ensure drawing scales and tolerances are in accordance with the LANL Drafting Manual, OST220-03-01-DM.

7.2.6 Use Appropriate Text Size, Font Styles, Symbols, Line Weights

The **Design Agent** shall ensure the use of appropriate text size, font styles, symbols and line weights in accordance with the LANL Drafting Manual, OST220-03-01-DM.

7.2.7 Use Standard Sheet Identification

The **Design Agent** shall ensure the arrangement of drawings is by discipline, in a defined order, and assigned a unique number in accordance with the LANL Drafting Manual, OST220-03-01-DM.

7.2.8 Indicate Interfaces

The **Design Agent** shall ensure drawings clearly show the new work required and indicate the interfaces with existing facilities.

7.2.9 Use Standard Drawing-Sheet Signatures

7.2.9.1 The **Design Agent** shall ensure the title block on a standard drawing sheet contains boxes for the signatures of persons with different levels of responsibility for production and quality control.

7.2.9.2 The **Design Agent** shall ensure that any drawing that is included in a contract document or issued for construction displays all the required signatures.

7.2.9.3 The **Design Agent** shall ensure that the initials and signatures are always of a person, never the company.

Note: One person may sign twice on a drawing if that person has performed two functions (e.g., the **UTR** may check a drawing and also have the authority to approve it). If more than one person makes a substantial contribution to a category below, each should sign to indicate responsibility for that contribution.

Note: Refer to LANL-ER-QP-6.3, Design Reviews for specific instructions for performing reviews and completing signature approvals.

7.2.10 Assign Drawing Numbering

The **Design Agent** shall ensure the numbering of drawings for the ER Project for identification, tracking, and change control, as follows:

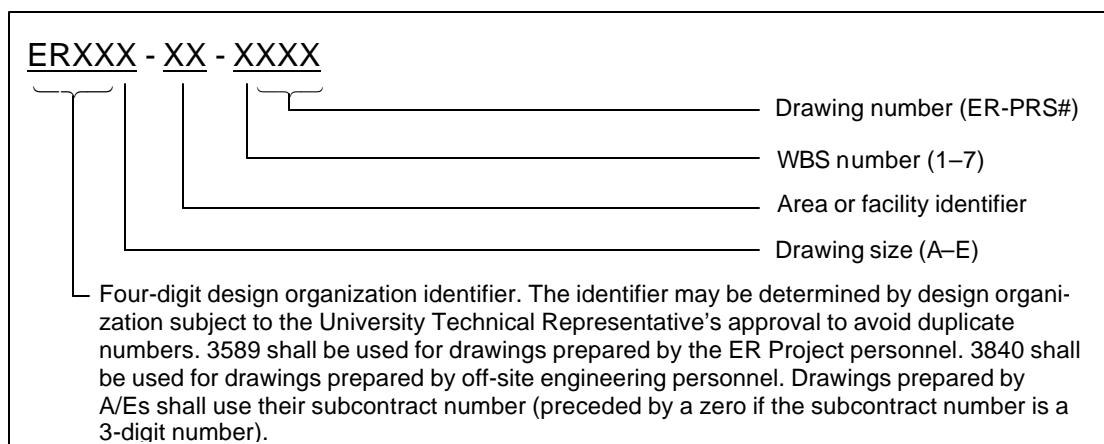


Figure 1. Typical Drawing Number Elements

Note: The revision number or letter is separate from the drawing number and placed in the “REV” box of the title block.

7.3 Seal Construction Documents

7.3.1 The **Design Manager** shall ensure design agents comply with the LANL Engineering Manual (LEM) and the New Mexico Engineering and Surveying Practice Act (Chapter 61, Article 23 NMSA 1978) for sealing of construction documents.

7.3.2 The **Design Manager** and the responsible **UTR** shall ensure all plans, designs, drawings, specifications, or reports prepared by consultants or subcontractors that are involved in the practice of engineering bear the seal and signature of a professional engineer in responsible charge and directly responsible for the engineering work.

7.4 Control Revisions to Certified Drawings

The **Design Manager** shall ensure revisions to drawings are made by the design firm or organization (A/E) that originated the drawing, unless the contract or agreement for services of said organization was closed. In that case, the responsible **UTR** shall designate the organization responsible for revisions.

7.5 Control ER Project Certified Drawings

The **Design Manager** and the responsible **UTR** shall ensure no one revises ER Project certified drawings without the certifying professional's prior knowledge and approval.

Note: This does not apply if the person changing the document recertifies it by applying his/her professional engineer's seal and signature.

7.6 Control Certified Drawings by Non-ER Project Architect/Engineering Firms

The **Design Manager** and the responsible **UTR** shall ensure no one revises a certified drawing without the certifying professional's prior knowledge and approval.

Note: If the A/E is no longer under contract to the ER Project, make modifications to the drawings only if the drawings undergo the recertification process.

7.7 Review and Approve Revised Drawings

The **Design Manager** shall ensure revisions to drawings receive levels of approval required for the original document before issuance for construction of the revised drawing (see LANL-ER-QP-6.3, Design Reviews, for further details).

7.8 Maintain Record Drawing Copies

7.8.1 The **Design Manager** shall ensure the design firm or organization retains record copies of all current and superseded drawings.

7.8.2 The **Design Manager** shall ensure superseded copies are marked to indicate that they are not current and are not in effect.

7.9 Review, Approve, and Control Drawings

7.9.1 The **Design Manager** shall ensure the review of all drawings in accordance with Procedure LANL-ER-QP-6.3, Design Reviews, or in accordance with approved A/E procedures meeting the minimum standards of LANL-ER-QP-6.3, Design Reviews.

7.9.2 The **Design Manager** shall ensure the approval of drawings for issue for construction per the requirements of this procedure and after the design verification in accordance with LANL-ER-QP-6.3, Design Reviews.

7.9.3 The **Design Manager** shall ensure that the note "**NOT FOR CONSTRUCTION**" is entered (e.g., marked in red ink) on all in-progress construction drawing sheets in a Construction Drawing Set.

7.9.4 The **Design Manager** shall ensure that the notation remains on the drawings until drawing approval for final release.

7.10 Revise “Issued for Construction” Drawings

7.10.1 The **Design Manager** shall ensure revisions to “issued for construction” drawings are approved by persons identified in the revision-approval blocks in the following sequence:

- a. Certifying Engineer (before transmittal to site)
- b. Off-site Quality Manager (before transmittal to site)
- c. Task Leader
- d. ER Quality Program Project Leader or designee (i.e., Quality Liaison)

7.10.2 The **Design Manager** shall date the revision.

Note: Design personnel leave the date open in the revision block until the Design Manager dates the revision.

7.11 Control As-Built Information

The **Task Leader** shall ensure the entry of as-built Information as follows:

- Supply the input of revisions due to construction changes to the Design Agent in the form of marked-up prints (e.g., red lined drawings), in accordance with see LANL-ER-QP-6.8, Design Changes.
- Submit all approved and opened Design Field Changes to the Design Agent for incorporation into the record drawing and for closure of the Design Field Changes in accordance with LANL-ER-QP-6.8, Design Changes.

7.12 Enter Record Drawings Identification

The **Design Agent** shall ensure the entry of record-drawing identification information as follows:

- Designate all record drawings by using the next sequential revision number.
- Prepare record drawings in accordance with the LANL Drafting Manual, OST220-03-01-DM.

7.13 Issue Record Drawings

The **Design Manager** shall ensure the issuance of record drawings as follows:

- The **Design Agent** shall transmit all record drawings to the Record Processing Facility for distribution to controlled copyholders of record drawings with the exception of subcontractors.

- The **Design Agent** shall retain marked-up prints identifying changes for inclusion in the permanent record files for the work package.

8.0 LESSONS LEARNED

- 8.1 Before performing work, **ER Project personnel** should go to the U.S. Department of Energy, lessons-learned web page, located at <http://www.tis.eh.doe.gov/II/II.html> and/or the Los Alamos National Laboratory, lessons-learned web page, located at http://www.lanl.gov/projects/lessons_learned/, and search for applicable lessons.
- 8.2 During the performance of work, **ER personnel**, as appropriate, shall identify, document, and submit lessons learned in accordance with LANL-ER-QP-3.2, Lessons Learned, located at http://erinternal.lanl.gov/home_links/Library_proc.shtml.

9.0 RECORDS

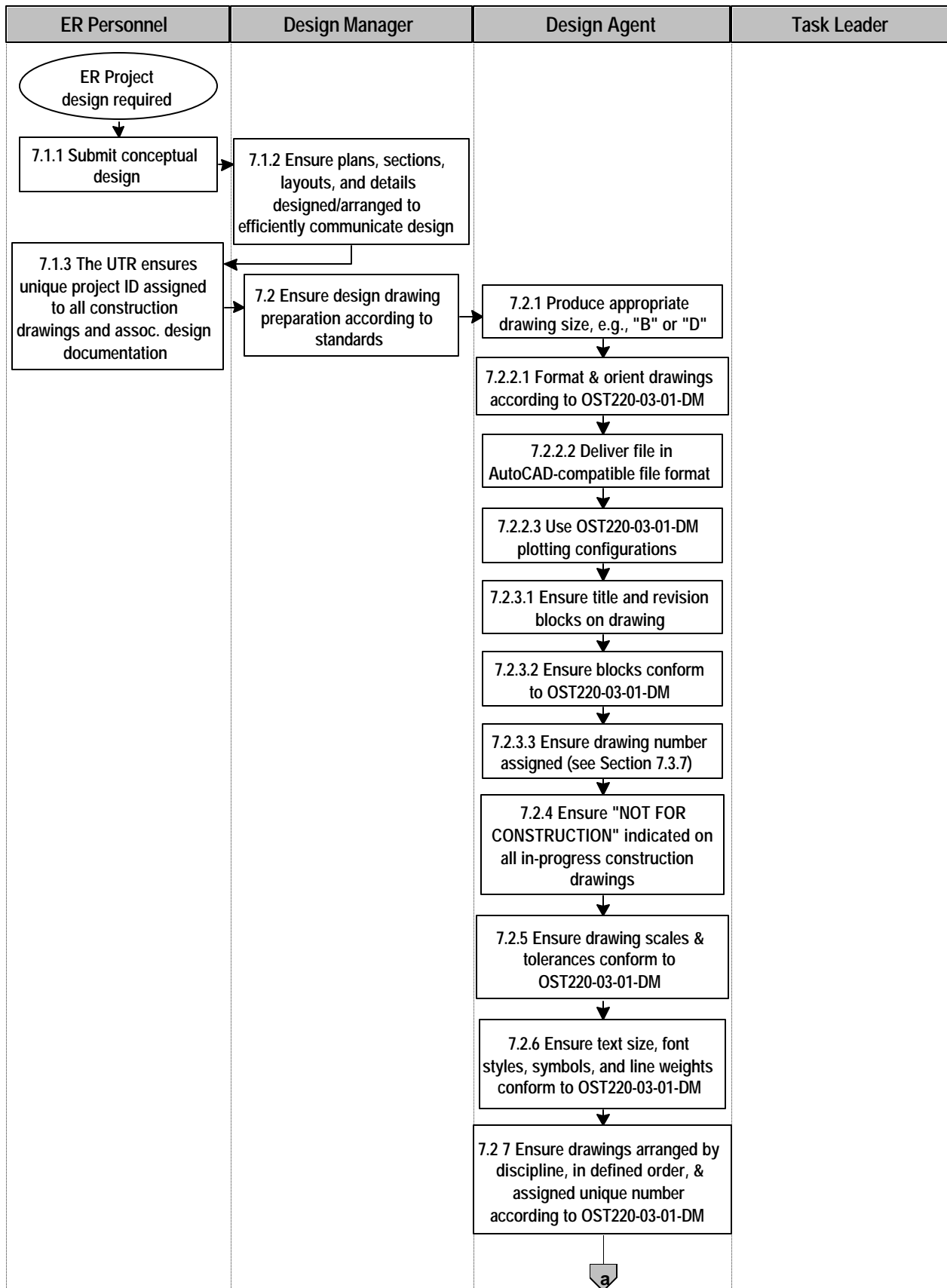
The **Design Agent** is responsible for submitting the following records (processed in accordance with LANL-ER-QP-4.4, Record Transmittal to the Records Processing Facility) to the Records Processing Facility.

- Original drawings Issued for Construction
- Record Drawings (As-Build drawings)
- Associated review and approval documentation

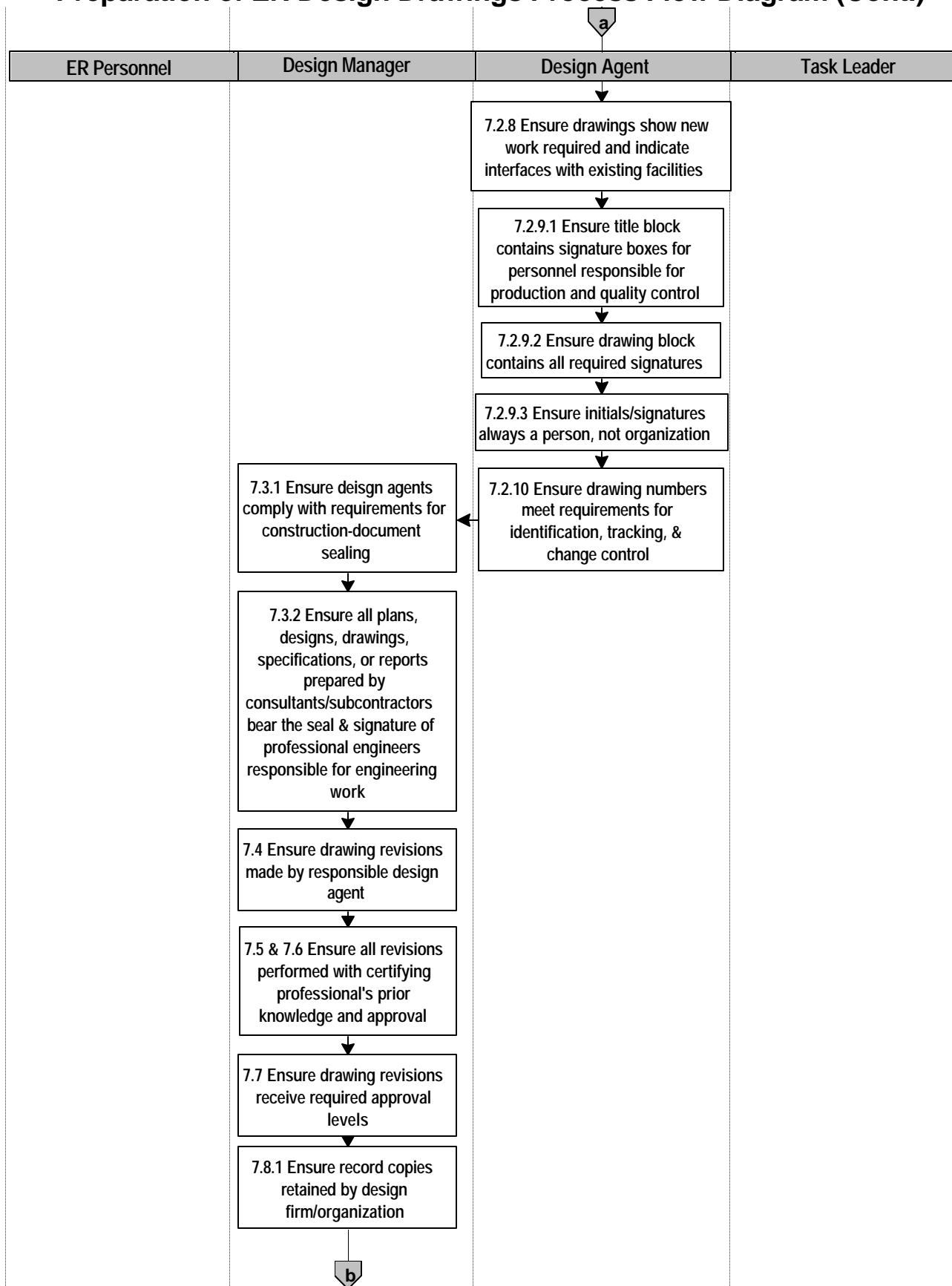
10.0 ATTACHMENTS

Attachment A: Preparation of Environmental Restoration Design Drawings
Process Flow Diagram (3 pages)

Preparation of ER Design Drawings Process Flow Diagram



Preparation of ER Design Drawings Process Flow Diagram (Cont.)



Preparation of ER Design Drawings Process Flow Diagram (Cont.)

